Neutrino Element Owner's Manual

8/20/18

Congratulations on your purchase of the Neutrino Plus Element integrated power distribution and control system. Not only does this product represent the state of the art in power distribution and control, but offers a range of essential information. Most importantly, the system will acquire additional talents over time as updated software is made available for download.

Installation of the system is covered under the quick installation guide available on our support site, so we won't cover that again here. The purpose of this manual is to show you how to use the system to its fullest capability.

Connection and Configuration

The first thing to do is to tell your Element that it's ok to communicate with your phone. To do this tap the units of measure button on the first page of the app and then tap the Neutrino Select button.Then select either one or multiple Neutrino modules and tap the connectable yes button. Once your phone and the Element module are communicating, configuring the system is easy and fun.

Note: your phone must be "connected" to Element in order to program the module. Settings are saved when the ignition is shut off. If you shut down the app before the ignition, settings won't be saved.

1. **Assigning circuits.** Element has 6 circuits, 3 ground terminals, a relay input, and a direct battery charger input in the main wiring bundle. All circuits are capable of 25 amps with a maximum of 60 amps for the system.

Note on grounding. Element includes a ground plane. This allows you the flexibility to take ground from either the Element module or from the chassis. This not only greatly simplifies installation, but it also allows for direct connection of sensitive audio equipment without the risking ground loop issues resulting from the use of chassis ground.

There are 3 ground connections on the module, one on either end of the connector strip and a third adjacent to the relay switch input. You can use any of these 3 ground points for any of your circuits. It is permissible to double up inputs to the ground connectors as long as the maximum load for any connector is no greater than 20 amps.

The relay switch terminal, in-between the 2 ground terminals on the left will accept an input from an external switch to trigger any combination of circuits on Element. The Element app is used to configure circuits to be relay controlled. (see below)

2. Diagnostics. Now that you've got all your circuits hooked up it's time to talk about diagnostics.
First, the module includes a status LED on the backside of the board "tongue"...opposite the blue terminal strip. Normal operation is for this LED to glow green when the vehicle ignition is on and white when a phone is connected.

The system includes circuit level diagnostics both on the module and in the phone app. Let's first talk about the on-board module diagnostics.

If you look at the base of the circuit board, where it exits the case, you will see 6 LEDs. Each of these indicates the status of the corresponding circuit. If there is no light, the circuit is not energized. If there is an amber light, the circuit is energized and everything is normal. If there is a red light, however, this means that there is a short circuit.

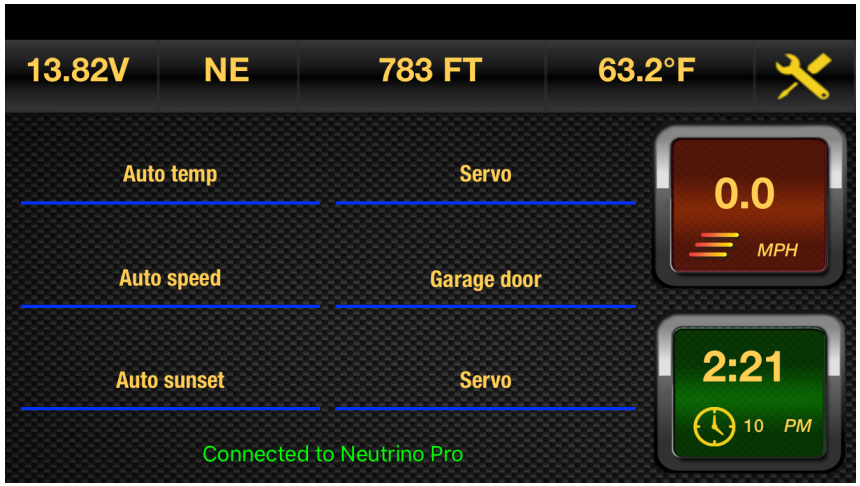
You can also get similar information from the application. As a circuit is energized the bar will change from blue to red. If, however, there is a short circuit, the voltage indicator will turn red....a clear indicator that something is wrong.

The good news is that the circuit breakers will immediately shut the circuit down and will stay shut down until the short is rectified.

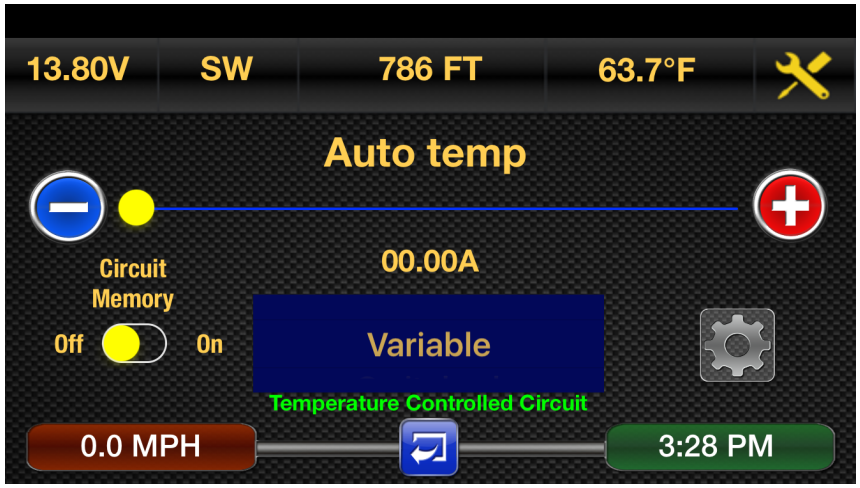
Please note that in the event of a short circuit, you will see a flashing red indicator.

3. Configuring circuits
In order to configure the circuits you will need to launch the Element app on your phone and make sure you are connected. In order to make a connection the ignition system of the host vehicle must be switched on.

To get started, tap any one of the circuits and the following screen will appear.



Starting from the left, the first option is circuit memory. If set to “off” this circuit will revert to the off state after a



restart. If set to the “on” this circuit will return to the state it was in when the system was last shut down. Very convenient for circuits that need to be on whenever the vehicle is on or after stopping for fuel.

The next option on this screen is a scroll wheel that offers the following choices for circuit behavior:
- variable
- switched
- momentary
- servo (only on circuits 4 and 6)

These options determine what the circuit will do when activated. Variable allows for infinite gradation of circuit activation...useful for heated gear and dimming lights.

Switched causes the circuit to act like a switch...100% on or 100% off. This is useful for circuits that need 100% power all the time. Examples would be power supplies, GPS units, radios and USB power sources.

Momentary allows for only a quick blip of circuit activation. This is designed for accessories that require only a spike to activate...such as garage door openers. (used with the garage door activator module)

You can adjust the duration of a momentary pulse by tapping the gear icon at the lower right and selecting relay circuit control. From there twirl the right scroll wheel to the desired pulse duration. (between 100ms and 2 seconds)

The other option on this screen is setting up relay control. What this does is to use an INPUT to the relay input terminal (2nd from the right on the terminal strip)

and allow you to configure any number of circuits to activate or deactivate using this input.

To use this feature make sure Element is “connected” to the app and switch the relay control on. Then choose what electrical input to use to activate the circuit. The options on the left scroll wheel are ground, open, and 12V. While the typical configuration is to activate the circuit when 12V is sensed on the input, one can also configure circuits to activate when sensing ground or

nothing at all. This allows you to configure several different circuits to behave completely differently based on the same input.

Circuits 3 and 4 offer an additional option:
Servo mode uses both circuits 3 and 4 to allow servo motor operated devices such as exhaust valves, hood lifters and wing actuators. Holding your finger on either the reverse or forward buttons will activate the servo motor in the intended direction. (requires optional servo adapter)

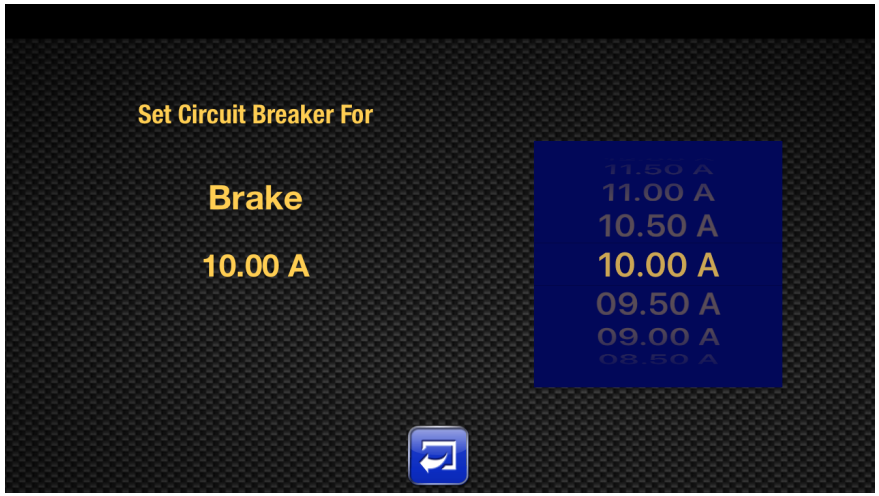
Note: For both servo and link functionality it’s essential to set the circuit breaker levels to be the same on circuits 3 and 4.

Moving further to the right is the gear icon which will take you to circuit customization screen.

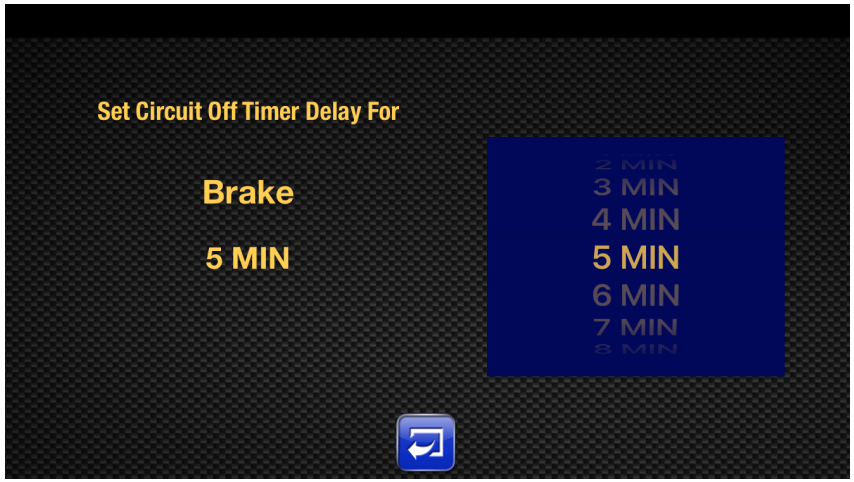
This screen allow you to name the circuit by tapping the circuit name, access the relay control screen, set the

circuit breaker limit, and set how the circuit behaves when the ignition is off.

To set circuit the break limit for this circuit simply twirl the wheel to the desired amperage value.

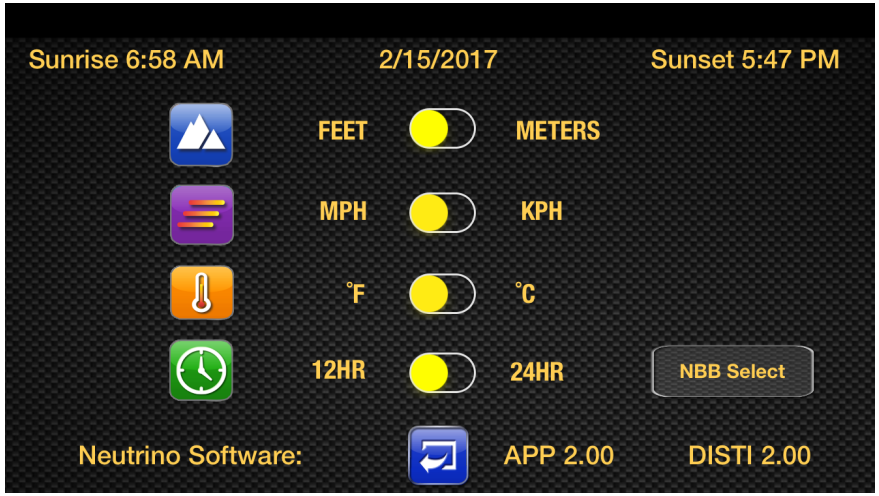


The third option on the gear screen is off timer setting. This is where you can set the circuit to remain on after the vehicle has been shut down. The choices are for up to 4 hours or voltage dependent, which will keep that circuit on until the battery voltage drops below that level.



These are the basics of circuit setup. Please note that each circuit is independent and all the parameters set for that circuit will be unique to that circuit.

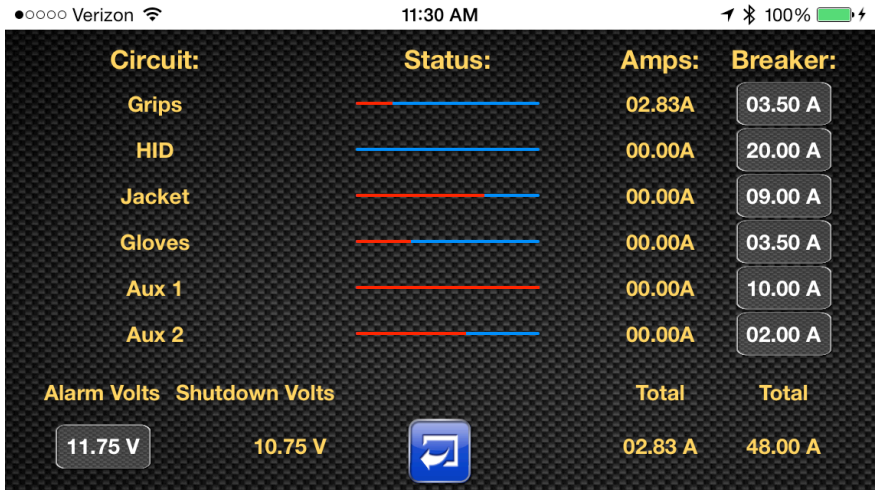
4. **Global settings.**
Units of measure. If you tab back to the first page you will see an icon at the upper right of the screen that will allow you to set units of measure. Here you can choose between feet and meters, miles per hour or kilometers per hour, temperature in fahrenheit or centigrade, and time in either 12 or 24 hour format. You are free to mix and match any of these to your preference.



This page also shows calculated sunrise and sunset times plus the application and module software levels.

Global electrical settings. To access these tap the voltage indicator on the first page and you will be presented with a grid view of the entire electrical system. Here you can see the realtime status of each circuit, the

current amperage draw by circuit, total amperage draw. You can also adjust the alarm voltage.



To do this, tap the alarm voltage button on the lower left of the screen and you will get a scroll wheel where you can set a voltage at which you want the system to let you know that the vehicle voltage is below what you deem to be a safe level. This will also cause the automatic shutdown voltage to be set at 1 volt lower than the alarm setting. As discussed earlier, this shutdown voltage will be used to shut down a circuit where you have designated it as being voltage-dependent.

Now that the system is all set up the way you want it, it's time to use it to actually control circuits. Here's how it works.

5. Using the system.

There are several different ways to use Element. First, there's manual control. Any combination of circuits can be set up to be purely manually controlled. This means that it takes just a finger moving on the screen to turn a circuit on, turn the temperature up...whatever you wish.

Of course you may have circuits set to automatically activate when the system starts up, and these can be manually overridden as desired. If desired one can configure Element to perform basic power distribution functions without connection to a smart phone.

Then there's relay control;. In this scenario an input is taken from a horn or high beam or any other vehicle circuit and fed into the relay switch input terminal on the Neutrino module.

It's then a simple matter to configure any number of circuits to automatically activate or deactivate based on sensing voltage (or lack of voltage) at the relay switch input terminal.

It's entirely possible to have several circuits set to always activate when the ignition is energized while several others are manually controlled, while a couple more are activated based on the status of an external circuit.

Element offers a wide range on control options with total circuit independence, allowing you extreme flexibility in how you configure your system.

Warnings:

1. Don't reverse polarity! As noted in the quick setup guide shipped with the Element module, it's critically important that you don't reverse polarity when you connect the module to the battery. If you do, you may cause irreparable damage to the Element module that cannot be repaired and will not be covered under the warranty

2. The battery charger input in the main wiring bundle is shipped without a an installed fuse. Since the battery charger input runs directly from the charger to the battery it's critically important that you make sure to install a fuse (included in the box) in the fuse holder.

3. While we know this is motherhood and apple pie stuff, please don't make circuit adjustments and the like unless it's completely safe to do so. Operating a motor vehicle while distracted is extremely dangerous to you and every creature around you, so please be careful. We strongly recommend that circuit adjustments only be made when on the open road, far away from other vehicles, with flat terrain, and with minimal chance of animal interactions. Better yet, stop the vehicle and make the adjustments.

4. While the Element module is completely waterproof, if you mount it where water can get to the powered accessory connections it's important that you waterproof these connections. We recommend the use of silicone grease for this purpose as it's easily applied, easily removed, and will definitely keep water from affecting the circuit connections. We also recommend mounting it with the terminal strip facing down so that water can't pool.

5. While we've gone to lengths to minimize the risk of damaging the NBB via electro static discharge, as with all microprocessor-controlled devices, if you zap it with enough voltage it's possible to damage the unit. This can easily be avoided by simply touching your finger to a metal part on the vehicle and doing the same with any wire you are about to insert into a NBB terminal before interacting with the terminals on the NBB.

Specifications:

Element is .9" thick, 3" wide, and 2" deep, exclusive of wires and connector strip.
Epoxy encapsulated and waterproof.
Weight 12 oz.

Electrical:
Total capacity is 60 amps at 12.5 volts.
Each circuit is capable of 25 amps.

Parasitic losses:
Running w zero circuits on 29mA
Additional load per circuit activated is 16mA
Drain when unit is shut down is 1.1mA
Trigger wire drain is .2mA

Arboreal Systems, Inc.
Berkeley, CA

Connectivity:
Data: USB socket on pigtail accepting USB> BTLE adapter.

Terminal connections: 10 screw terminals capable of up to 14 AWG wire. Includes 3 ground connections, 6 power outputs and 1 relay input.

Wire Inputs:
Direct battery charger input connections.
Remote thermosensor.
Ignition status sensor.

Just in case:
In the unlikely event of a software lockup please disconnect the positive lead from the Element module to the battery momentarily. This should reset the module to normal operation.

Warranty: one year (or longer)

Please download the Element install guide at:

http://media.wix.com/ugd/d44451_eca6e02deb7142ecbe71612c97a0384d.pdf

For product support:

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call us at 510-356-4235